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1911/12

BULLETIN

COLLEGE OF ENGINEERING

OHIO NORTHERN UNIVERSITY, ADA, O

UNIVERSITY OF ILLINOIS
AUG 1911
PRESIDENT'S OFFICE

CALENDAR

FALL TERM, SEPT. 5, 1911
WINTER TERM, NOV. 14, 1911
MIDDLE TERM, JAN. 23, 1912
SPRING TERM, APRIL 2, 1912

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UNIVERSITY BULLETIN

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Northern Univ
Engineering
1911-12.

Engineering Society

This is strictly a students' organization which meets weekly to discuss the "topics of the day" pertaining to Engineering, thus broadening their knowledge and encouraging research. While the students usually render the program, yet upon many occasions addresses upon topics of general interest are given by eminent speakers from abroad, or by members of the faculty.

The following clipping was taken from a two-column report in the March 3, 1911, issue of The University Herald, and refers to the Annual Exhibit of the work of the students of the College of Engineering. This exhibit is held under the auspices of the Engineers' Society:

Last Friday night marked another era of progress in the history of the College of Engineering of the O. N. U. Ten years ago in the reading room of O. N. U. the exhibit was first held. From that small beginning the interest has grown and the department developed until today the largest auditorium in the town is inadequate to hold the people who flock to see the exhibit and hear the addresses.

The hall was beautifully decorated with pennants and engineer colors. The program consisted of orchestral music, a solo by W. H. Tischer, and selections by the Engineer Quartet, and addresses by Mr. Alva Cole, Engineer of Construction, U. S. A., Columbus, O., and Mr. Henry Earle Riggs, senior member of the firm of Riggs & Sherman, Toledo, O. Dean T. J. Smull was chairman of the evening and introduced the various speakers.

We first visited Administration Building and were piloted thru a maze of flying belts and electric apparatus that would make the old-time student marvel at the progress made in this department. Here were engines, both gas and steam, running dinamos, generating electricity and forming a complete electric light plant of both incandescent and arc lights. In this system were all the essentials of transformers, resistance boxes and other delicate mechanism for studying the character and action of the electric current. In the engine room and in the laboratories were students making careful tests and taking notes on their experiments. Dynamos were being dissected and their mechanism studied, resistance was being tabulated and to the observer it was a revelation to see the miracle-working current studied and displayed in its marvelous service for mankind or turned as it may be into an agent for death and destruction.

But we must not dwell too long in Administration. Let us enter Brown. All about the walls are displayed intricate drawings representing days and weeks of labor; drawings of buildings, bridges; the large city map drawn by the students, involving much time and expense, was on display on the east side; vast sketches of plans and specifications; masses of plans and designs —a profusion to bewilder the uninitiated mind. In one corner a group of students were engaged in the practical work of the department, and the use of the various instruments, triangles, etc., could be observed. The editor acknowledges the kind courtesy shown him by these students in answering many inquiries.

FIELD WORK ON O. N. U. FARM

UNIVERSITY OF ILLINOIS

FACULTY AND INSTRUCTORS.

ALBERT EDWIN SMITH, D. D., PH. D.,
President of the University.

EMMA HUFFORD, M. S., Auditor.

THOS. J. SMULL, M. E., C. E., Dean,
Civil and Architectural Engineering.

D. D. EWING, M. E., E. E.,
Electrical and Mechanical Engineering.

R. H. HAIGHT, B. S. in C. E.,
Mining and Municipal Engineering.

MRS. EVA MAGLOTT, A. M., C. E.,
Mathematics.

JESSE BEER, B. SC.,
Physics and Chemistry.

MISS IONA KILMER, B. PED.,
Geometry.

FREDERICK MAGLOTT, A. M.,
Trigonometry and Astronomy.

MARY H. LEY, B. F. A.,
Freehand and Perspective Drawing.

SAMUEL P. AXLINE, LL. D.,
Contracts.

FRANK B. WILLIS, A. M., LL. B.,
Algebra and Economics.

WILLIAM GROTH, A. B.,
Spanish, French and German.

GROVER C. KREGLOW, B. S., A. B.,
Geology and Mineralogy.

LENIX C. SLEESMAN, PH. G., PH. C.,
Metallurgy.

CHARLES S. FREEMAN, B. SC.,
English.

G. S. SMALL,
Assistant in Engineering Laboratory.

E. L. MERRY,
Assistant in Drafting Room.

O. G. LEAPLEY,
Assistant in Surveying.

P. S. BOOKWALTER,
Assistant in Mathematics.

F. L. BERGER,
Assistant in the Chemistry and Physics

CHAS. B. WRIGHT, G. S.,
Corresponding Secretary O. N. U.

OHIO NORTHERN UNIVERSITY BULLETIN

New Series. ADA, OHIO, JUNE, 1911 Vol. V., No. 1

FOLKS IN RUTS.

Th' world is full o' ruts, my boy, some shaller an' some deep;
An' ev'ry rut is full o' folks, as high as they can heap.
Each one that's grovelin' in the ditch is growlin' at his fate,
An' wishin' he had got his chance before it was too late.
They lay it all on someone else or say 'twas just their luck—
They never onct consider that 'twas caused by lack o' pluck.
But here's the word of one that's lived clean through from soup t' nuts—
The Lord don't send no derricks 'round t' hist folks out o' ruts.

Some folks has stayed in ruts until they didn't like th' place,
Then scrambled bravely to th' road an' entered in th' race.
Sich ones has alwas found a hand held out for them t' grab
An' cling to till they'd lost the move peculiar to a crab.
But only them that helps themselves an' tries for better things
Will ever see th' helpin' hand t' which each climber clings.
This here's the hard, plain, solemn facks, without no "ifs" or "buts"—
Th' Lord don't send no derricks 'round t' hist folks out o' ruts.

—Baltimore American

COLLEGE OF ENGINEERING.

T. J. SMULL, Dean

"We must not delude ourselves by imagining that the happiness and welfare of mankind depend only on its material advancement, or that moral, intellectual, and spiritual forces are not in the ultimate resort of greater moment. But if the inquiry be propounded what it is that has made possible this amazing material progress, there is but one answer that can be given—science. Chemistry, physics, mechanics, mathematics—it is these that have given to man the possibility of organizing this tremendous development; and the great profession which has been most potent in applying these branches of science to wield the energies of nature and direct them to the service of man has been that of the engineer. Without the engineer, how little of all this activity could there have been."—S. P. Thompson, D. Sc., F. R. S.

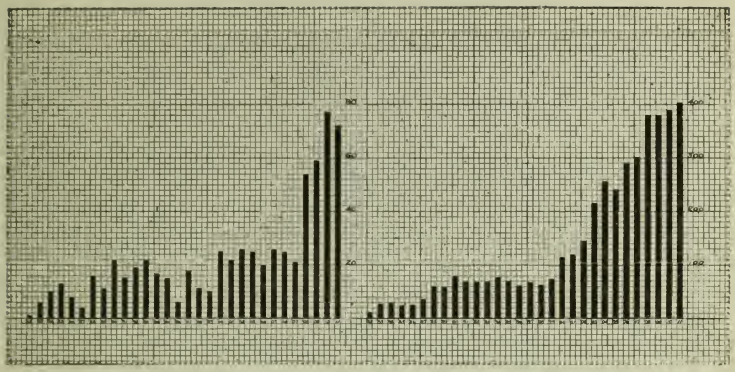
This is emphatically the peoples' college. Everybody is admitted on the basis of character, without written examination. This school is cosmopolitan. *It is pre-eminently the school for the student of moderate means.* Without endowment it occupies a unique place among the great educational forces of America. Each student is given large liberty, both with respect to the choice of studies and with respect to the amount of work undertaken. This does not mean that he is left without direction and advice; but it does mean that the student who is fitted, physically and mentally, to move rapidly with his studies is given every opportunity to make the very most of his time. A fine distinction is made, however, between "cramming" and proper assimilation.

In almost every community, in almost every rural district, there are young men (and women also) who are devoting their time to manual labor, who, through economy have laid by a little money. They look about them and observe the advantages of an education. In earlier years they failed to use their opportunities, or what is more frequent, they had no opportunities, for obtaining an education. They would now enter some school and begin at the bottom and work up if they were confident that such a school could be found. A school where they would not feel embarrassed by being forced to recite with more educated students.

No school in America has done more for this backward class than has ours. Nor is our attendance confined to local patronage. Pennsylvania with her rich resources and great demand for Engineers has contributed hundreds of students to our classes. And this is true to somewhat less extent of every state in the Union; also many have come from foreign lands.

The aim of the Department is to lay a foundation of sound theory, and at the same time to impart such knowledge of the usual professional practice as shall make its students useful in any position to which they may be called.

Class room and public lectures of special interest to Engineers are given from time to time by the leading consulting engineers of this vicinity. Our Engineering students are strongly advised to devote their vacations to surveying, draughting, work in factories, repair shops, electric light and railway stations and similar work, in order to obtain commercial experience and a better appreciation of the relation of technical training to practical work.

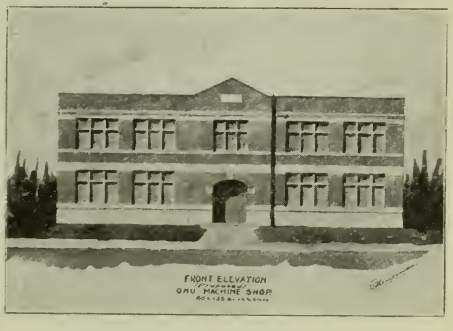


GRADUATES ATTENDANCE

The above diagram represents the growth of the College of Engineering since 1881

BRIDGE DESIGN

ARCHITECTURAL DESIGN



The success of the course of training offered by the college is testified to by the very large per cent. of the graduates who are engaged in occupations connected with engineering.

THE OHIO NORTHERN UNIVERSITY.

The Ohio Northern University is located at Ada, in Northwestern Ohio, on the Pennsylvania Railroad (Pittsburg, Fort Wayne & Chicago Division). It is midway between the intersection of the Cincinnati, Hamilton & Dayton, the Detroit, Toledo & Ironton and Lake Erie & Western Railways at Lima, and the Big Four at Forest. Connection is made with the Hocking Valley at Upper Sandusky thirty miles east, and with the Ohio Central Lines at Dunkirk, ten miles east.

It May Interest You.

The technical branches are under the direct care of those who have had professional experience as well as a full scientific training.

Are you satisfied with your present position?

Are you making from $75 to $300 per month?

Are your chances for advancement satisfactory?

If not read this circular carefully.

Our Motto:

We give students what they want, when they want it.

Expenses.

On account of the large number of students attending school at the Ohio Northern University the cost of living has been reduced to a minimum. Tuition for a term of ten weeks, $12.00. Good board in private families can be obtained at prices ranging from $1.65 to $2.00 per week, and a well furnished room at from 50 to 75 cents per week. Ada is a school town and the majority of the families are engaged in boarding and rooming students. The competition is sharp; hence prices are low and board is good.

Some schools advertise free tuition, but it will be found that entrance fees with them amount to more than tuition fees here, a

fact not to be overlooked by those selecting a school, thorough, yet inexpensive.

There is no registration or matriculation fee required.

There is no "breakage fund" fee required.

A nominal fee is required in laboratory and field work.

For $36.00 paid in advance the University agrees to furnish any person tuition, board and furnished room for 10 weeks; this is called the term plan. Everything considered we do not believe this can be equalled by any school in the United States.

Time to Enter.

The large number of classes formed each term makes it possible for a person to enter at almost any time during the year and find the work he wishes. The best time to enter, however, is at the beginning of the term. See calendar.

In view of the fact that we present nearly every branch of study in the College of Engineering from two to five times a year, we claim the right to make the above assertion.

NOTE—See general catalogue for further advantages.

Time Required.

The object of the founders of the Engineering Course of the Ohio Northern University was to provide a school which would be able to furnish an engineering education with the least possible expenditure of time and money. In looking around for a solution of this problem it was found that about three-eights of the time allotted to the Engineering Course in other technical schools was devoted to the study of subjects which have no direct bearing upon Engineering, and it was found by dropping these subjects, **the time could be shortened to about two and one-half years.** In thus reducing the length of our courses, we have called down upon ourselves the censure of many technical schools throughout the United States who claim that a thorough knowledge of Engineering can be obtained only by a long college course. In this connection we wish to state that we have shortened our courses by throwing out such subjects as French, Greek, German, Zoology, etc., which have no direct bearing on Engineering.

By doing this we have placed an Engineering degree within

reach of thousands of worthy young men whose time and means will not permit them to spend the long period of four years in preparation for a profession.

In refutation of this censure permit us to make a comparison of total number of credit hours required for graduation with those of other technical institutions. As a concrete example we will look at the calendar of one of the most prominent technical schools in the land.

Registration days	Monday, Tuesday, Oct. 4, 5
Thanksgiving vacation	Nov. 24 to Nov. 29
Christmas vacation	Dec. 23 to Jan. 4
Easter vacation	Mar. 25 to April 1
Semester examinations close	May 27
School year	32 weeks
Four year course	128 weeks
Class exercises	18¼ hrs. per week
Full course	2336 hours
Less 150 hours credit for Thesis	2186 hours

Now let us look at our calendar.

Registration day	Tuesday, Sept. 5
Christmas vacation	Dec. 22 to Jan. 2
School year closes	Friday, Aug. 9
School year	48 weeks
Twelve term course	116 weeks
Class exercises	20 hrs. per week
Full course (required)	2300 hours

*All graduates required to prepare a thesis, but not included in above 2300 hours.

By careful study of above table you will note the first institution requires 2186 hours of actual class work as compared to 2300 hours required by us. Since we have dropped some of the secondary subjects as heretofore mentioned, it is a well established fact that we give more technical training, hour for hour, than 90 per cent. of all other technical schools.

We do not wish to be understood as finding fault with these apparent longer courses which, in addition to a thorough scientific training, carry with them the benefits of classical culture; and to accommodate those who may thus wish to broaden their education, **the excellent instruction of the Classical and Literary departments of the University are thrown open to all Engineering students free of extra tuition.**

ADMISSION.

Students having a knowledge of the necessary prerequisites for entrance into the various courses herein set forth will be permitted to register as candidates for any such Engineering degree.

See list of Prerequisites on Page 26.

Any preparatory work a student may need, may be taken here either separately or in connection with the advanced work.

Admission With Advanced Standing.

The College is glad to receive graduates and students from all other colleges and a liberal policy with regard to Credit for work done elsewhere is followed. Some Credit is given for practical experience in draughting and field work that has been pursued previous to matriculation, upon receipt of a satisfactory statement from the employer, stating the nature of the work and the length of time employed. All statements must be addressed to the Professor-in-charge and shall contain postoffice address as well as signature of employer.

All requests for information regarding admission should be addressed to the Dean.

Options.

With the advice and consent of the Professor-in-charge, certain subjects can be elected in the various courses to replace such as may not appeal to the student in his chosen profession. These are termed options, and are found in the schedule of the course.

DEGREES.

The University is empowered to grant the customary scholastic degrees, which, in the College of Engineering are, Bachelor of Science, (B. S.), Civil Engineer, (C. E.), Mechanical Engineer, (M. E.), Electrical Engineer, (E. E.), Engineer of Mines, (E. M.), and also those of Municipal Engineer, Sanitary Engineer, Chemical Engineer, and Architect, but aims to bestow them on the deserving only. Such honors are not for sale, but must be earned and merited. The management accepts grades of equal value from other institutions of learning, yet the applicant for a degree is required to do a reasonable portion of his work here. No diploma is granted on grades made wholly in other institutions. **No student carrying more than two subjects will be excused from the Final Examination during his Senior Term.**

THESES.

Every candidate for a degree must prepare a thesis upon some technical or scientific study, which lies within the field of the degree sought, and may either be designing, construction, testing or research, and if the latter a minimum of 5000 words will be required. The same to be selected with the approval of the professor-in-charge.

PORTION OF THESIS

The form of the finished thesis must be in accordance with the requirements of the department and the library and be deposited with the Dean at least one term before the conferring of the degree.

SEMINARY.

Weekly conferences on current engineering events and discussion of engineering papers. It shall be the aim of those in charge to have a critical study of senior theses made at this time.

GOVERNMENT.

The University publishes no stereotyped rules of conduct for its patrons. Each student is placed upon his honor. While students are assisted in forming correct habits, this is not a reform

school. Persons who cannot govern themselves are not wanted. The opportunities and advantages of the University are offered to all who earnestly desire to develop the best there is in them and wish to fit themselves for usefulness. All are treated as ladies and gentlemen until they prove themselves otherwise. Regular attendance in classes and thoroughness of work is insisted upon. Incorrigible and morally corrupt persons are dismissed from the University.

1. A student cannot be a candidate for more than one professional degree at the same time.

2. A candidate for a degree must comply with all requirements in force at the time said degree is conferred.

3. A student will be permitted to substitute one subject for another as outlined under the subject of Options.

4. Final examinations for Fall, Winter and Middle Terms, will be held on Wednesday and Thursday of the tenth week; in the Spring and Summer Terms on Wednesday and Thursday of the ninth week. Mid-term examinations are also held at the end of the fifth week of each term.

5. Special examinations for students debarred or deficient at regular examinations are also held the last Tuesday of each term. A fee of $1.25 for each subject will be exacted.

6. The following method of grading is in effect: A, 90 to 100; B, 80 to 90; C, 70 to 80; D, 60 to 70; E, Failure.

7. Any student being given a grade D will be "conditioned" and required to take the next regular examination in that subject. In case the subject is not repeated during the school year he will be given the opportunity of a special examination as provided under Section 5.

7. Failing to pass the second examination or having received a grade E at the first examination, he must repeat the subject with the next class. Failing a third time under the first condition, or the second time under the second condition to pass a satisfactory examination, he shall be dropped from the roll of the school.

8. Before entering on any study the student must give the instructor satisfactory evidence that he is prepared to pursue it with advantage.

9. The Faculty requires a student to drop a part of his work at any time, if in its opinion he is undertaking too much; or to take additional work, if it thinks he is not sufficiently employed.

10. No credit will be allowed to a student for work in any course, unless the election of the work is formally entered on his classification blank before the work is begun.

11. After the first Saturday of each semester no study can be taken up or dropped without special permission of the Faculty.

12. After matriculation, a student cannot, without special permission of the Faculty, be admitted to examination in any one of the courses given, until he has received in the University the regular instruction in such course.

STUDENT HELP.

The Board of Education of the M. E. Church lends money to those who are taking a course in school and have been in attendance long enough to merit a recommendation from the Faculty. No interest is charged for two years from date of graduation, and no security is required further than a recommendation from a quarterly conference and from the Faculty. Many of our best students avail themselves of this advantage.

For further information address Prof. R. H. Schoonover, Ada, Ohio, who has charge of this fund.

There is also an Employment Bureau conducted by the Y. M. C. A. whereby many of our students make their entire expenses working as waiters, janitors and at other occupations in town and nearby, being able at the same time to carry on their studies in full work. There is no reason why an ambitious and capable young man or woman desiring an education should not obtain it at the Ohio Northern University.

25 REASONS WHY.

1. Because students can enter at any time and find what they want.

2. Because the University receives students of all grades of scholarship.

3. Because all of her instructors are specialists in their line.

4. Because her instructors are kind and sympathetic, and make the welfare of the student of first importance.

5. Because her instructors do not lecture two or three times a week and turn their classes over to an assistant instructor (or in some cases a member of the senior class) for quiz work and

grading, which is so prevalent in most technical schools.

6. Because her instructors spend from four to six hours each day in the class room, assisting each student in the analysis of every detail of the subject, thus bringing to them an opportunity for advancement afforded by no other method and by few other schools.

7. Because of the wonderful enthusiasm everywhere manifested in recitation room and out.

8. Because the work is practical and fits young men and women "to do things."

9. Because she offers thorough work in many special lines.

10. Because she invites inspection as to the work done and guarantees what she advertises.

11. Because expenses are low—so low that many find it cheaper to go to school here than to stay at home.

12. Because nowhere else can so much be gotten for so little money.

13. Because the school is the friend of the poor boys and girls, and furnishes them an opportunity to get an education they could not otherwise obtain.

14. Because of the strong intellectual and social environment felt everywhere within her walls and in the town.

15. Because of the healthy moral and religious life felt throughout the school and town.

16. Because the citizens of the town take a deep interest in the students and try to make their stay pleasant.

17. Because the student can take just such studies as he needs and is not confined to a special curriculum of studies.

18. Because where the student is compelled to drop out of school for any reason, he does not lose his standing in his classes, as all grades are recorded on our books, and the student having earned them, may take them elsewhere, or he may re-enter at any time and begin where he left off, and complete his course of study.

19. Because the town is healthy and free from the vices so common in the larger cities.

20. Because the students room and board in private families and the home life is not sacrificed by rooming in dormitories.

21. Because no entrance examinations are required of students before they can be admitted to full standing in the University classes.

22. Because every student is treated as a gentleman or lady. They are placed upon their honor.

23. Because our students know the true worth of hard honest work. Lazy students are not countenanced.

24. Because our students are satisfied with the work of the University and work for her. They are our best advertisements and our best advertisers.

25. Because the country has come to recognize the character of the instruction given here and the demand for our graduates to fill places of trust, honor and profit is greater than the supply.

CIVIL ENGINEERING.

This is the parent stem of engineering pursuits, and in its broader sense includes all branches of surveying and engineering construction. Many of its former departments have grown into separate professions, yet there still remains a broad and important field, offering larger opportunities than ever before. Besides the basic sciences common to all branches of Engineering (Mathematics, Physics, Chemistry, Astronomy and Mechanics) the technical instruction includes Drawing, Surveying, Railroad Engineering, Strength of Materials, Roofs, Bridges, Foundations, Arches, Retaining Walls, Dams, Waterworks, Improvements of Rivers and Harbors, Sewerage, Drainage, Hydraulics, Water Power and Geodesy.

The method of teaching is by means of class-room exercises, field work, practical drawing and designing. Much time is devoted to the study of steel and concrete construction, during which the student is made familiar with the computation of stresses, designing, detailing and drawing of Roofs, Bridges and Steel and Concrete Construction of all kinds. The subjects of Roads and Pavements, Railroad Construction and Maintenance, and Masonry Construction are exhaustively treated. Special attention is given to Land, Typographical, Stadia and City Surveying and Leveling. We aim to fit men to act as county and city engineers, surveyors, railroad engineers, bridge engineers, structural engineers, hydraulic engineers and government geodetic engineers.

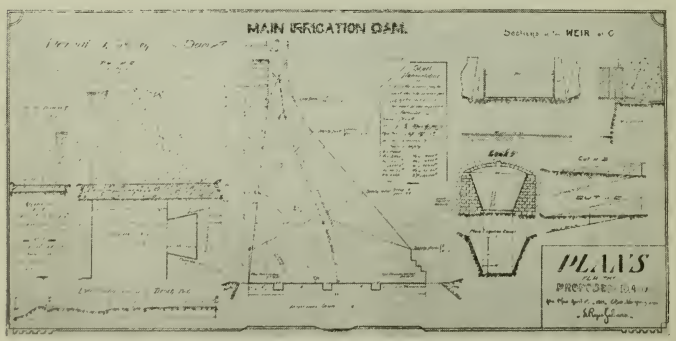
Besides the regular undergraduate work, special and more elaborate work will be given to those wishing to prepare for special positions.

Practically all local improvements are under the direct supervision of the College of Engineering. Many thousands of dollars have been expended the past few years for Street Paving, Macadamizing, Sewerage, etc., the major portion of the engineering work being done by the students themselves. During the present year an extensive sewer system, together with considerable street improvement is being projected, and will thus give the student an opportunity of getting an insight into real engineering practice, which combined with theoretical instruction presents unexcelled opportunity for advancement.

Equipment.

Our equipment is second to none, being composed of high grade Transits, Levels, Sextant, Solar Compasses, Plane Tables, Hand Levels, Aneroid Barometers, Stadia Outfits, Sight Poles, Level Rods, Chains, Tapes, Axes, Pins, Rail Road Curves, Planimeters, Protractors, Stereotomy and Descriptive Geometry Models, a collection of Photographs and Shop Drawings of Bridges and Buildings, a large modern Draughting Room, equipped with individual lockers, a complete Blue Printing Outfit and filing cases by which the student is familiarized with modern office methods, **Projectoscope and numerous Engineering Slides, and an excellent Scientific Library.** This equipment is constantly being added to by purchase and donation and by construction by students of the College of Engineering.

The following is a schedule of the course offered, showing the number of credit hours per week devoted to each subject:



PORTION OF THESIS

Schedule of Course.

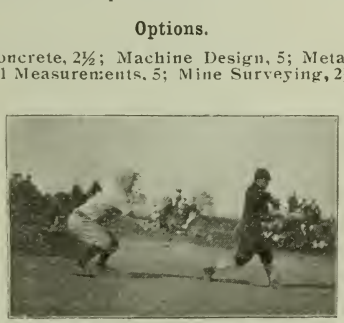
FIRST TERM.	Credit Hours
Algebra III	5
Free hand Drawing	5
Trigonometry I	5
Lettering	5
THIRD TERM	
Algebra V	5
Projections	5
Analytics II	5
Calculus I	5
FIFTH TERM	
Calculus III	5
Descriptive II	5
Physics IV	5
Chemistry II	5
SEVENTH TERM.	
Mech. of Materials II	5
Masonry	5
Physics VI	5
Field Eng.	5
NINTH TERM.	
Stresses II	5
Graphics II	5
Astronomy	5
Rail Road II	5
ELEVENTH TERM	
Bridge Design II	5
Hydraulics I	5
Least Squares	5
Elec. Rys.	2½
Estimates and Contracts	2½
Seminary	1

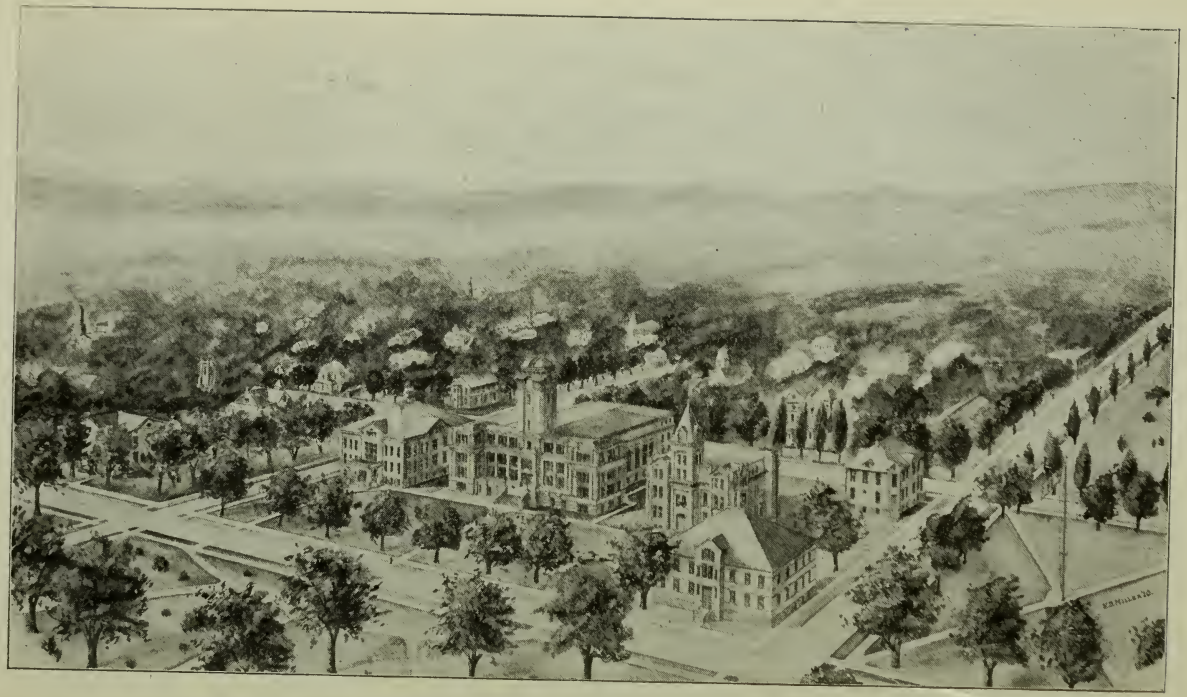
SECOND TERM	Credit Hours
Algebra IV	5
Mechanical Drawing	5
Trigonometry II	5
Analytics I	5
FOURTH TERM	
Calculus II	5
Descriptive I	5
Anal. Mechanics	5
Chemistry I	5
SIXTH TERM.	
Mech. of Materials I	5
Geology	5
Physics V	5
Plane Surveying	5
EIGHTH TERM.	
Stresses I	5
Graphics I	5
Stereotomy	5
Rail Road I	5
TENTH TERM	
Bridge Design I	5
Field Astronomy	2½
Higher Structures	5
Sewerage	2½
Highway Engineering	2½
Seminary	1
TWELFTH TERM.	
Building Construction	5
Hydraulics II	5
Geodesy	5
Seminary	1
THESIS	

Note—230 credit hours are required for graduation.
Note—Two hours field work constitutes one credit hour.
Maximum number of hours per week—20.
Minimum number of hours per week —15.

Options.

Reinforced Concrete, 2½; Machine Design, 5; Metallurgy, 2½; Mineralogy, 5; Electrical Measurements, 5; Mine Surveying, 2½; Irrigation, 2½.

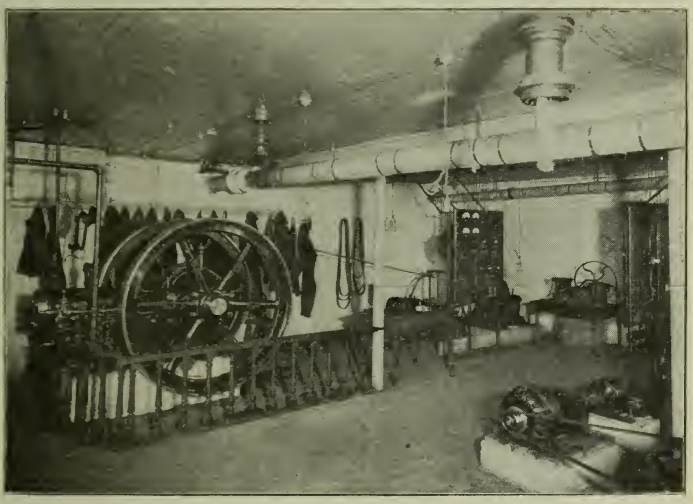




A DREAM OF THE FUTURE OF THE O. N. U.

ELECTRICAL ENGINEERING.

The course given in this branch of Engineering consists of a thorough study in theoretical and applied electricity. Its object is to so train and develop the student that he may successfully take up the practical work in those branches of Engineering in which electricity plays an important part. The first half of the course is in general the same as is given in Civil and Mechanical Engineering, and includes courses of instruction in the fundamental Engineering sciences, Mathematics, Drawing, Surveying.



CORNER OF ELECTRICAL LABORATORY

The last half of the course consists of courses of study in Stresses, Graphics, Strength of Materials, Hydraulics, Steam Engines, Advance study in the Theory of Electricity, a large amount of Laboratory Research and Experiment, Shop Tests, Plant Testing, Meter Testing, Machine Drafting and Designing, Power Plant and Wiring Layouts, and a thorough course in Electrical Machine Construction.

In the class room effort is made to acquaint the student with all the best books and periodicals on the subjects studied. The theoretical work is everywhere carefully illustrated by practical applications, much stress being laid on the laboratory work and the design of electrical machinery. Throughout the course the student is drilled by having to solve many numerical problems, thus firmly fixing the theory of the subject studied.

Equipment.

The Electrical Laboratory is well equipped for testing and experimental work. New apparatus is constantly being added to the equipment. Apparatus for special experiments is constructed by the students themselves. A gas engine driven lighting plant lights the buildings and grounds.

Both this plant and the plant of the Ada Water, Heat and Light Company are available for inspection and tests by the students. In the laboratory both direct and alternating currents are available for testing purposes. As part of the equipment may be mentioned the following: A General Electric three phase generator arranged with two sets of windings so that it can supply either three phase alternating current or direct current, a control board equipped with suitable switches and circuit breakers, meters, etc., for controlling same, a fedder board for supplying either three phase or single phase current to the testing leads, several transformers representing the types of transformers manufactured by almost all of the well known electrical manufacturing companies, a Westinghouse induction motor so arranged that it may be operated either single phase or polyphase, a Wagner induction motor, an Emerson induction motor, a Westinghouse D. C. generator, a two panel switch board fully equipped with meters, switches, circuit breakers, etc., for controlling D. C. generator, ballastic galvanometers, static galvanometers, Wheatstone bridges, X-Ray apparatus, frequency meter, speed indicators, prony brakes, rheostats, and about thirty-five voltmeters, ammeters representing nearly all the best known makes of instruments. In addition to the above the department is supplied with a number of small motors, generators, testing keys, arc lamps, Nernst lamps, lamp banks and auxiliary apparatus such as may be found in any well equipped laboratory. All of the service meters of the local lighting company are repaired and calibrated in the Electrical Laboratory, thus giving the student unexcelled opportunities along the line of meter design and operation.

The following is a schedule of the course offered, showing the number of credit hours per week devoted to each subject:

Schedule of Course.

FIRST TERM	Credit Hours
Algebra III	5
Freehand Drawing	5
Trigonometry I	5
Lettering	5
THIRD TERM	
Algebra V	5
Projections	5
Analytics II	5
Calculus I	5
FIFTH TERM.	
Calculus III	5
Physics IV	5
Machine Drawing	5
Chemistry	5
SEVENTH TERM.	
Mechanics Mat'ls II	5
Mach. Design II	5
Elem. Elec. Eng.	5
Elec. Mach. I	5
NINTH TERM	
Elec. Mach. IV	2½
Elec. Mach. V	5
Steam Engines	5
Differential Equations	5
ELEVENTH TERM.	
Elec. Mach. VII	5
Elec. Mach. VIII	5
Hydraulics I	5
Elec. Rys.	2½
Estimates and Contracts	2½
Seminary	1

SECOND TERM.	Credit Hours
Algebra IV	5
Mechanical Drawing	5
Trigonometry II	5
Analytics I	5
FOURTH TERM.	
Descriptive Geometry	5
Plane Surveying	5
Calculus II	5
Chemistry I	5
SIXTH TERM.	
Mechanics Mat'ls I	5
Analytical Mechanics	5
Machine Design I	5
Physics VI	5
EIGHTH TERM.	
Elec. Mach. II	5
Elec. Mach. III	5
Masonry	5
Physics V	5
TENTH TERM.	
Elec. Mach. VI	5
Stresses I	5
Graphics I	5
Electrical Transmission	5
Seminary	1
TWELFTH TERM.	
Elec. Mach. IX	5
Theory of Alter. Currts	7½
Hydraulics II	5
Seminary	1
THESIS	

Note—230 credit hours are required for graduation.
Note—Two hours' laboratory work constitutes one credit hour.
Maximum number of hours per week—20.
Minimum number of hours per week—15.

Options.

Descriptive Geometry, 5; II Stresses, 5; Structural Design, 5; Electric Meters, 5; Storage Batteries, 5; Telephone Engineering, 5; Metallurgy, 2½; Railroad Engineering, 5; Gas Engines, 5; Illuminating Engineering, 5.

MECHANICAL ENGINEERING.

Mechanical Engineering deals with transformation and transmission of energy, and with the theory and construction of mechanism and machinery.

The course here given is designed to equip the student with the theoretical and practical training, such that he will easily be able to cope with intricate and complicated problems arising in this phase of engineering. The first half of the course consists of the usual basic engineering studies. In the latter half of the course the special Mechanical Engineering studies are taken up.

Thoro training is given in Machine Drafting, Machine Design Thermodynamics, Steam Engines, Steam Boilers, Gas Engines Electrical Machinery and Steam Power plants. The text book work is well supplemented with lectures, laboratory work and the solution of many numerical problems.

Equipment.

Within the past year the University has enstalled a gas engine driven lighting plant and a central steam heating plant, lighting and heating all the University buildings from the central plant. This equipment has been enstalled with special convenience for making tests on the boilers, heating apparatus and power apparatus. In addition the Central Heating and Lighting Plant of the Ada Heating and Light Co. with its equipment of the Corliss engines, high pressure cold and hot water pumps, boilers, etc., is open to the students for inspection and test. Thus affording the students in the Mechanical Department very large facilities along the line of plant inspection and plant testing.

The following constitute part of the equipment: a small verticle fire tube boiler, both arranged with complete facilities for performing complete boiler tests, a throttling governor slide valve engine, automatic slide valve engine, a double cylinder single acting automatic rotary valve engine, a high pressure steam pump, and rotary pump, a hit and miss governed gas engine that may be operated on either gas, gasoline, kerosene or alcohol, engine indicators, calorimeters, thermometers, prony brakes, injectors, lubricators, gauges, planimeters and a number of cross sectional models of various engineering devices.

The following is a schedule of the course, showing the number of credit hours per week devoted to each subject:

CORNER OF MECHANICAL LABORATORY

Schedule of Course.

FIRST TERM	Credit Hours
Algebra III	5
Freehand Drawing	5
Trigonometry	5
Lettering	5
THIRD TERM	
Algebra V	5
Projections	5
Analytics II	5
Calculus I	5
FIFTH TERM.	
Calculus III	5
Physics IV	5
Descriptive Geometry II	5
Chemistry II	5
SEVENTH TERM.	
Mechanics Mat'ls II	5
Thermodynamics	5
Physics VI	5
Mach. Design I	5
NINTH TERM.	
Stresses I	5
Graphics I	5
Steam Eng. Design	5
Elem. Elec. Eng	5
ELEVENTH TERM.	
Hydraulics II	5
Elec. Mach. III	½
Struct. Design	5
Elec. Mach. V	5
Seminary	1

SECOND TERM	Credit Hours
Algebra IV	5
Mechanical Drawing	5
Trigonometry II	5
Analytics I	5
FOURTH TERM.	
Calculus II	5
Descriptive Geometry I	5
Plane Surveying	5
Chemistry I	5
SIXTH TERM	
Mechanics Mat'ls I	5
Physics V	5
Analytical Mechanics	5
Machine Drawing	5
EIGHTH TERM.	
Mach. Design II	5
Theory of Steam Eng.	5
Masonry	5
Metallurgy	2½
Mechanical Lab. I	2½
TENTH TERM.	
Stresses II	5
Mech. Lab. II	5
Elec. Mach. I	5
Hydraulics I	5
Seminary	1
TWELFTH TERM.	
Steam Turbines	5
Gas Engines	5
Estimates and Contracts	2½
Steam Power Plants	5
Seminary	1
THESIS	

Note—230 hours are required for graduation.
Note—Two hours laboratory work constitutes one credit hour.
Maximum number of hours per week—20
Minimum number of hours per week—15

Options.

Electric Mach., IV., 2½; Bridge Design, 5; Railroad Engineering, 5; Reinforced Concrete, 2½; Heating and Ventilation, 5; Gas Engine Design, 5; Steam Piping System, 5; Producer Gas and Gas Producer, 5.

MUNICIPAL AND SANITARY ENGINEERING.

This branch of Engineering is probably more nearly related than any other to the parent stem of Civil Engineering. The instruction consists of the basic Engineering sciences, and most of the general Civil Engineering subjects, special attention being paid to those branches which have to do with public health. This calls for a better knowlege of Chemistry, Bacteriology and Sanitation than can be obtained in the usual courses in Civil Engineering, and additional work is given in Topographic Survey-

ing, Water Supply, Sewer Design, Sewerage Disposal, Roads and Pavements, and Precise Surveying.

At no time in the history of all countries has there been a greater demand for improved highways. Comparatively few men of this country have given the matter of highway construction the study which the subject deserves and it naturally follows that there is a great demand for men trained in the art of road building.

City improvement mentioned in another article affords a splendid opportunity to those following this course of study. A few of the many essential features which we might mention, i. e., establishing street and sidewalk grades, cross-sectioning and computing earthwork, laying out street and alley intersections, installation of sewers and accessories, inspection. specifications, advertisements, proposals, and lettings.

NOTE—See general catalog for course of study.

MINING ENGINEERING.

This course includes most of the Civil Engineering subjects and an extended study of Historical, Dynamical and Economical Geology, Mineralogy, Metallurgy, Hydraulics and the assaying of Gold, Iron, Silver and Copper.

NOTE—See general catalog for course of study.

CHEMICAL LABORATORY

ARCHITECTURE.

The object of this course is to unite a thorough knowledge of the mechanics of materials and engineering constructions with a special training in Architectural Design and Decorative Art. The instruction consists of basic Engineering Sciences, most of the general Civil Engineering subjects, and an exhaustive course along the lines of Architectural History, Ornamentation, Decoration, Architectural Designing, Heating, Ventilating, Plumbing, Estimates, Fire Proofing and Superintendence.

NOTE—See general catalog for course of study.

SCHEDULE OF CLASSES.

For the convenience of students who may desire to attend the University during certain terms only, or those who may wish to specialize along certain lines, we have arranged the following condensed form of the schedule of the different subjects which are taught during the school year.

There are many special classes formed in connection with these.

Fall Term	Winter Term	Middle Term	Spring Term	Summer Term
Algebra III	Algebra III	Algebra III	Algebra III	Algebra III
Algebra IV	Algebra IV	Algebra IV	Algebra IV	Algebra IV
Algebra V		Algebra V		Algebra V
Trigonometry I	Trigonometry I	Trigonometry I	Trigonometry I	Trigonometry I
Geology	Trigono. II	Geology	Trigonometry II	Geology
Chemistry I	Chemistry I	Chemistry I	Chemistry I	Chemistry I
Chemistry II	Chemistry II	Chemistry II	Chemistry II	Chemistry II
Freehand	Freehand	Freehand	Freehand	Freehand
Lettering	Lettering	Lettering	Lettering	Lettering
Analytics II	Analytics I	Analytics II	Analytics I	Arch Draw
Calculus I	Calculus II	Calculus III	Anal. Mechanics	Arch Design
Astronomy	Anal. Mechan.	Calculus I	Calculus II	Calculus III
Physics IV	Physics VI	Physics V	Astronomy	Field Astronomy.
	Perspective	Physics IV	Physics VI	Physics VI
Mech of Mat I	Mech of Mat II	Mech of Mat I	Mech of Mat II	Masonry
Stresses I	Stresses II	Stresses I	Stresses II	Higher Str.
Graphics I	Graphics II	Graphics I	Graphics II	Est. and Con.
Hydraulics I	Hydraulics II	Hydraulics I	Hydraulics II	Highway Eng'r
Bridge Des. I	Bridge Des. II	Bridge Des I	Bridge Design II	Descriptive II
Elec Mach II	Elec. Mach. VI	Elec. Mach. IX	Elec. Mach. II	Elec. Meters
Elec Mach III	Elec Mach IV	Elec Mach VII	Elec Mach VIII	Storage Batteries
Elec Mach V	Mach Des I	Elect Mach I	Elec Railways	Telephone Eng'r
Gas Engines	Mech Lab I	Mech Lab II	Adv.Alt.Cur.	
Steam Eng	Steam Turbines	Mach Des II	Steam Boilers	Mine Surveying
	Steam Engine	DeThermodyn	Rail Road I	
Mach Draw	Rail Road II	Higher Str.	Plane Surv.	Rail Road II
	Field Eng'r.	Masonry	Mech Draw	
RailRoad I	Mech. Draw	Projections	Descriptive I	Field Eng'r.
	Descriptive I	Descriptive II	Re-inforced	
Plane Surv.	Mineralogy	Metallurgy	Stereotomy	Mech. Draw.
	Sewerage	Least Squares	Geodesy	
Projections		Contracts	Irrigation Con	OPTIONS

Mathematics.

1. **Algebra III.**: Special stress is laid on factoring, radical quantities fractional exponents, the solution of simple equations of one, two or more un known quantities and the quadratic of one unknown. Text: Wentworth. Prerequisite: Alg. I. and II.

2. **Algebra IV.**: The large part of this course is a study of the quadratic equation, followed by the surds, the imaginaries, the binomial theorem and arithmetical, geometrical and harmonic series. Text: Wentworth. Prerequisite: Alg. III.

3. **Algebra V.**: An exposition of the theory of logarithms; permutation combinations, choice and chance.; determinants; theory of equations. Text: Wentworth. Prequisite: Alg. IV.

4. **Trigonometry I.**: Plane. This course includes the theory of the trigonometric functions and their application to the solution of right and oblique triangles; the use of tables; the solution of a large number of practical problems. Text: Murray. Prerequisite: Alg. II. or High School equivalent.

5. **Trigonometry II.**: Gives attention to the solution of trigonometric identities, the solution of trigonometric equations and the theory and solution of spherical triangles. Text: Murray. Prerequisite: Trig. I.

6. **Analytical Geometry I.**: The properties of the straight line, the circle, and the parabola. Text: Gale and Smith. Prerequisite: Trig. I.

7. **Analytical Geometry II.**: The ellipse, the hyperbola, the discussion of the higher plane curves and solid analytical geometry. Text: Gale and Smith. Prerequisite: Anal. I.

8. **Calculus I.**: Differential Calculus. Differentiation of functions; applications of the derivatives; maxima and minima of functions. Text: Granville. Prerequisite: Analytics I.

9. **Calculus II.**: Infinite Series. Curvature of curves; evolutes and involutes; curve tracing; infinite series; integration. Text: Granville. Prerequisite: Calculus I.

10. **Calculus III.**: Integral Calculus. Indefinite integration, and the application of integral calculus to the solution of practical problems. Text: Granville. Prerequisite: Calculus II.

11. **Differential Equations**: Solution of problems of the first and second degree. Text: Johnson. Prerequisite: Calculus III.

12. **Analytical Mechanics**: In order to prepare for the more technical studies of Mechanics of Machinery and Applied Mechanics, a course in the principles of Mechanics is given. The text-book is supplemented with original problems so as to get the student into the habit of analyzing these problems and using his own methods of solution. Text: Maglott. Prerequisites: Calc. I.

Physics and Chemistry.

4. **Physics IV.**: (University Physics—Mechanics): Kinematics, kinetics. elasticity, mechanics of fluid, lectures, class exercises and laboratory work, Text: Carhart's University physics. Prerequisites: Physics I., II., and III. and Calculus I.

5. **Physics V.**: (University Physics—Sound, Heat and Light): Nature and motion of sound, theory of music, nature and propagation of light, refraction, reflection, dispersion and polarization, nature of heat, temperature, expansion, fusion, kinetic theory of gases. Text: Carhart's University Physics. Prerequisites: Same as in Physics IV.

6. **Physics VI.**: (University Physics—Magnetism and Electricity): Electrical charges, potential capacity, electrolysis, Ohm's law, electrodynamics electromagnetism, electro-magnetic induction, electric oscillations. Lectures and class exercises. Text: Carhart's University Physics. Prerequisites: The same as in Physics IV.

7. **Chemistry I.**: This is a course in the non-metallic elements and their inorganic compounds. The class work consists of lectures, recitations and demonstrations. In individual laboratory work, each student thoroughly investigates every subject. Text: Smith. Prerequisite: Physics I., II., III. Algebra 1.

8. **Chemistry II.**: In this course the metallic elements, their compound and chemical philosophy are theoretically and practically taught by lectures, recitations, demonstrations and much individual laboratory work by the student. Text: Smith. Prerequisite: Chemistry I.

Drawing.

1. **Freehand Drawing:** Sketching and pencil work.
2. **Lettering:** Freehand engineering lettering.
3. **Mechanical Drawing:** Use of drawing instruments, cabinet and isometric projections,working drawings. Text: Rhinehart's Mechanical Drawing. Prerequisite: Freehand drawing, geometry, lettering.
4. **Projections.:** Orthographic projections, intersections, shadows, elementary linear perspective. Text: Tracy's Mechanical Drawing. Prerequisite: Mechanical Drawing.
5. **Perspective:** Angular, parallel, vertical, curvilinear and perspective shades and shadows. Text: Ware's Modern Perspective. Prerequisite: Projections.
6. **Descriptive Geometry I.:** Advanced orthographic projection planes, single and double curved surfaces. Text: Church's Descriptive Geometry. Prerequisite: Projections.
7. **Descriptive Geometry II.:** Spherical projections, maps, shadows, perspectives. Text: Church's Descriptive Geometry. Prerequisite; Descriptive Geometry I.
8. **Machine Drawing:** Drafting room practice, conventions, detailing, assembly drawings, checking. Text: Reid's Machine Drawing and Elementary Machine Design. Prerequisite: Descriptive Geometry I.
9. **Machine Design I.:** (Kinematics of Machinery): Velocity diagrams, gears, cams, couplings, straight line and parallel motions. Text: Jones' Machine Design, Part I. Prerequisites: Machine Drawing, Mechanics I.
10. **Machine Design II.:** Form, strength, proportions, bearings, gears, shafts, couplings, fly-wheels, cylinders. Text: Jones' Machine Design, Part II. Prerequisites: Machine Design, Part I., Mechanics of Materials I.
11. **Stereotomy:** Intersecting arches, warped surfaces etc., modelling and drawing. Text: French and Ives' Stereotomy. Prerequisite: Descriptive Geometry.

Civil Engineering.

1 **Plane Surveying:** Chain, compass, level and transit use. Text-Pence and Ketchum's Manual of Surveying. Prerequisite: Trigonometry.
2. **Field Engineering:** Land, topographical, stadia and city surveying. Drawing room—platting, blue printing and tinting. Text: Professor's Notes. Prerequisite: Plane Surveying.
3. **Railroad Engineering I.:** Reconnaissance, preliminary and mathematics of curves. Text: Searle's Field Engineering. Prerequisite: Field Engineering
4. **Railroad Engineerng II.:** Location, maintenance, and economics. Text: Professor's notes and Talbot's Transition Curves. Prerequisite: Railroad I.
5. **Highway Enginering:** Location and construction of streets and pavements. Text: Baker's Roads and Pavements. Prerequisite: Field Engineering.
6. **Structural Geology:** A study of the earth's crust, dealing with rock form and structure, and the formation of mineral deposits and mountains. Text: LeConte.Prerequisites: Physical Geography, Chemistry and Physics.
7. **Sewerage:** Disposal and design. Text: Folwell's Sewerage. Prerequisites: Chemistry and Surveying.
8. **Irrigation:** History, methods of installation, cost. Text: Bowie's Irrigation. Prerequsites: Physics and Sewerage.
9. **Hydraulics I.:** Hydrostatic and hydromechanic pressures. Text: Merriman's Hydraulics. Prerequisites: Physics and Calculus.
10. **Hydraulics II.:** Hydraulic machinery. Text: Merriman Prerequisite: Hydraulics I.
11. **Least Squares:** Its relation to Engineering. Text: Merriman's Method of Least Squares. Prerequisites: Calculus, Mechanics.
12. **Astronomy:** Study of the celestial spheres. Text: Young's Manual of Astronomy. Prerequisite: Calculus.
13. **Field Astronomy:** Observation and computation. Text: Comstock. Prerequisite: Astronomy.
14. **Geodesy:** Geodetic surveying and map making. Text: Merriman. Prerequisite: Least Squares.

15. **Masonry:** Properties and uses of sand, brick, lime and cement. Text: Baker's Masonry Construction. Prerequisites: Stereotomy, Mechanics.

16. **Foundation and Retaining Walls:** Foundations, dams, retaining-walls, culberts, arches. Text: Baker. Prerequisite: Masonry.

17. **Mechanics of Materials I. and II.:** The course in Mechanics of Materials takes up work in elastic and ultimate strength of materials and treats of the simple stresses which may come upon materials. This is followed by elastic and ultimate deformations. This carries the student into a further discussion of the resistance and elasticity of materials, the theory of beams, continuous girders, columns and shafts. The course also includes a discussion of the resilience, combined and true stresses, and elements of the mathematical theory of elasticity. Text: Merriman's Mechanics of Materials. Prerequisites Higher Mathematics.

18. **Stresses I. and II.:** Roofs and bridges. Text: Merriman's Bridge I. Prerequisites: Higher Mathematics and Mech., of Mat.

19 **Graphics I. and II.:** Roofs and Bridges. Text: Merriman's Bridge II. Prerequisite: Higher Mathematics.

20. **Higher Structures:** Cantilevers, swing bridges, arches, suspension bridges. Text: Merriman's Bridge IV. Prerequisite: Stresses and Graphics.

21. **Bridge Design I.:** Roofs, trusses and plate girder bridges. Text: Merriman's Bridge III. Prerequisites; Stresses and Graphics.

22. **Bridge Design II.:** Complete design of simple trusses and special bridges. Text: Professor's Notes. Prerequisites: Bridge Design I.

23. **Building Construction:** Computation of Stresses and design of modern structures. Text: Ketchum's Mill Buildings. Prerequisites: Stresses and Graphics.

Electrical Engineering.

1. **Elementary Electrical Engineering:** Lectures, Problems and Laboratory work in electrical measurements. Prerequisite. Physics VI.

2. **Electric Machinery I.** (D. C. Generators).: Physical theory, construction, reactions, windings, Text: Sheldon's Dynamo Machinery, Vol. I. Prerequisites: Elements, Calculus I.

3. **Electric Machinery II.:** (D. C. Moters, Regulators, Balances): Theory and Construction. Text: Sheldon's Dynamo Machinery, Vol. I. Prerequisite: Electric Machinery I.

4. **Electric Machinery III.:** (D. C. Laboratory): Experimental work with direct currents and D. C. apparatus. Prerequisite: Electric Machinery I and II. Text: Karapetoff's Exper. Elect. Eng.

5. **Electric Machinery IV.:** (D. C. Machine Design): Practical design of a D. C. generator. Text: Crocker's Dynamo Design. Prerequisite: Electric Machinery II.

6. **Electric Machinery V.:** (A. C. Generators): Theory, construction, windings. Text: Sheldon's Dynamo Machinery. Vol. II. Prerequisite: Electric Machinery II.

7. **Electric Machinery VI.:** (Transformers): Theory, construction, design. Texts: Sheldon's Dynamo Machinery, Vol. II., Fleming's Alternating Current Transformers. Prerequisite: Electric Machinery V.

8. **Electric Machinery VII.:** (A. C. Motors, Synchronous and Induction): Theory, construction, diagrams, design. Text: McAllister's A. C. Motors Sheldon's Dynamo Machinery, Vol. II. Prerequisite: Electric Machinery VI.

9. **Electric Machinery VIII.:** (A. C. Design): Design of an A. C. Generator. Text: Torda's Dynamo Machinery, Vol. II. Prerequisite: Electric Machinery V.

10. **Electric Machinery IX.:** (A. C Laboratory): Prerequisite: Electric Machinery VII. Text: Karapetoff's Exper. Elect. Eng.

11. **Alternating Currents:** Advanced Theory, lectures, recitations and laboratory. Text: Bedell and Crehore. Prerequisite: Electric Machinery V.

12. **Electric Railways:** Probable earnings, surveys, construction, operating expenses, car barns. Texts: Herrick & Boynton's Electric Railway Practice, Gotscall's Electric Railway Economics, Current Periodicals. Prerequisite: For E,. E. Mach. VII.

13. **Electrical Transmission of Energy:** Circuits, losses, tests, circuit design. Text: Abbott's Electrical Transmission of Energy. Prerequisite: For E. E. Students E. E. Machine VII.

14. **Electric Meters** (D. C. and A. C. Meters): Theory, construction, cali-

bration. Prerequisite: Electric Machinery V. Text: Edgecumbe's.

15. **Storage Batteries:** Theory, construction. Prerequisites: Chemistry II., Electric Machinery I. Text: Lyndon Lamar's Storage Batteries.

16. **Telephone Engineering:** Circuits, apparatus, central office equipment, cable plant. Testing. Prerequisite: Electrical Machine I. Text: Miller's American Telephone Practice.

17. **Illuminating Engineering:** Theory and general principles, Photometry, calculation of Illumination. Text: Wicenden's Illumination and Photometry. Prerequisits, Physics V., VI.

18. **Electric Power Plant Engineering:** Power Plant Layouts, switch, gear, operation of plants. Text: Wicenden. Prerequisite, Physics VI.

1. **Thermodynamics:** Theory of heat, laws of dynamics, perfect gases, saturated vapors, superheated vapors. Text: Peabody's Thermodynamics. Prerequisites: Calculus II., First Year Physics.

2. **Theory of Steam Engines:** Steam engines, compound engines, engine testing, engine economy. Text: Peabody. Prerequisite: Thermodynamics.

3. **Steam Engine Design:** Complete design of a steam engine. Text: Whitham's Steam Engine Design. Prerequisites: Machine Design II., Theory of Steam Engine.

4. **Steam Boilers and Boiler Design:** Structure, design, fuels, heating surface, boiler trials. Text: Thurston's Manual of the Steam Boiler. Prerequisites: Thermodynamics, Machine Design II.

5. **Steam Power Plants:** Plant layouts, plant testing, economy, design. Prerequisites: Theory of Steam Engine, Steam Boilers.

6. **Steam Turbines:** Velocity and flow of steam, flow of steam through orifices, turbines, reaction turbines, impulse-reaction turbines. Prerequisite: Thremodynamics. Text: Moyer's.

7. **Gas Engines:** Liberation of heat energy, combustion, gas engines burning gas, gas engines using kerosene oil, gas engines using gasoline, automobile engines, ignition, carburation testing. Text: Hutton's The Gas Engine. Prerequisite: Thermodynamics.

8. **Mechanical Lab. I.:** Laboratory work in Heat measurements, Boiler Tests: Prerequisite: Thermodynamics.

9. **Mechanical Lab. II.:** Steam and Gas Engine Tests, Power Plant Test, Problems. Prerequisites: Theory of Steam Engines.

10. **Gas Engine Design:** Calculations and assembly drawing. Text: Lucke. Prerequisite, Gas Engines.

POSITIONS.

Our experience in the past has been that the demand made upon the College of Engineering for graduates has been far in excess of the supply. Many employers insist on us granting concessions whereby our men can get away at the very earliest moment to report for duty. The question is asked us sometimes whether we guarantee to secure positions for our graduates. This question we must answer in the negative, as no responsible school can afford to make such a guarantee.

There is not, to our knowledge, a single graduate (since the Department was founded) that is not holding a good position, the quality of which can be seen by referring to the roster of last year's class. Were we to go back to previous classes we would find men whose success has been thoroughly established by virtue of longer service, many of whom are holding most responsible positions.

Every member of this year's class has a position awaiting him. This is certainly ample proof to the most skeptical that our Institution is worthy of patronage.

CLASS OF 1911.

Cottrell, W. J. President. Small, Guerney Vice President.
Storer, Amanda M. Secretary. Myers, C. M. Treasurer.

Civil Engineering.

Bookwalter, P. S. . . Dayton, O.
Baughman, R. J. . Williamstown, O.
Bushey, H. D. . . Shelby, O.
Bender, E. A. . . Berea, Ky.
Carey, Clyde . . Ashtabula, O.
Clark, G. R. Burning Springs, W. Va.
Cragg, R. B. . Naugotuck, Conn.
Chenk, K. C. . . Shanghai, China
Cummings, Wm. . Tipperary, Ireland
Diefendorf, A. . Newark, N. J.
Davis, W. S. . . Harrisburg, O.
Evans, R. E. . . Sharon, Pa.
Elvers, Geo. C. . , Mason, O.
Enterline, M. O. . Brookville, Pa.
Frye, V. A. . . Oak Harbor, O.
Fry, A. J . . . Lafayette, Ind.
Fisher, H. E. . . Highland, O.
Grenadier, M. A. . Keipp, Russia
Gold, Max . . Philadelphia, Pa.
Geiger, Henry . . . Ada, O.
Huff, F. J. . . . Fresno, O.
Hubler, L. L. . . Youngstown, O.
Henneman, R. E. . Minneapolis, Minn.
Knight, G. L. . . . Malta, O.
Kemmer, L. H. . . Marion, Ind.
Linn, W. M. . Kennerdell, Pa.
Leapley, O. G. . . Sidney, O.
Mohr, R. E. . . . Dayton. O.
McCown, B. E. . Proctorville, O.
Monks, W. E. . . Valencia, O.
Mollenaur, F. S. . Eighty Four, Pa.
Maury, H. G. . . Clarington, O.
Merry, E. L. . . Caldwell, O.
Nichol, W. R. . St. Clairsville, O.
Nemesky, S. R. . Philadelphia, Pa.
Neiswander, T. R. Holmesville, O.
Raymond, E. A. . Carthage, N. Y.
Stineman. N. M. . Buffalo, N. Y.
Schellenburg, C. F. Wheeling. W. Va.
Salinas, L. R. . Sawtillo, Mexico
Thompson, R. W. . Burghill, O.
Thomas, Daniel . . Olephant, Pa.
Thorpe, W. F. . Washington, Ind.
Walsh, E. R. . . Elyria, O.
Wu, H. L. . . Canton, China
Wilson, C. W. . Youngstown, O.

Electrical Engineering.

Baumgartner, W. J. Philadelphia, Pa.
Cottrell, W. J. Grand Junction, Colo.
Carmer, R. K. . . Elmira, N. Y.
Dicke, O. H. . New Bremen, O.
Edwards, Elmer . Newark, O.
Henderson. H. M. Chambersburg, Pa.
Keefer, G. E. . . Antwerp, O.
Myers, C. M. . . Bloomdale, O.
Neiswander, R. P. . Toledo. O.
Olson, C. I. , . Pueblo, Colo.
Stecker, C. B. . Mt. Vernon, N. Y.
Shaffer, Irwin . . Scottsdale, Pa.
Small, Guerney . . Carmel, Ind.
Trench, E. E. . New Haven, Conn.

Mechanical Engineering.

Alter, H. F. . . Homestead, Pa.
Baumgartner, W. J. Philadelphia, Pa.
Olson, C. I. . . Pueblo, Colo.
Small, Guerney . . Carmel, Ind.

Municipal and Sanitary Engineering.

Bryson, Carl , Lima, O.

Architecture.

Miller, V. D. . . Greenville, O.
Storer, Amanda M. Taylorsville, O.
Unger, Wm. . Bucyrus, O.

Engineering Class
1911

Our Graduates.

Our graduates are our greatest advertisement, and the phenomenal growth of our school in the past few years is largely due to their hearty support. We are continually receiving letters from graduates who are now filling most responsible positions.

Hundreds of these grace our files and while heretofore it has been our policy to publish a few of them to demonstrate to the prospective student what many of our boys have been able to accomplish and the responsible positions held by them, yet owing to lack of space accruing from new features added to this issue of the bulletin we are unable to present any of them.

RAILROAD TOPOGRAPHY

PHYSICAL LABORATORY

CLASS OF 1910

UNIVERSITY OF ILLINOIS

Ash, Chas.—Sacramento Valley Irrigation Co., Willows, Calif.
Archer, A. A.—Reinforced Concrete Construction Co., Bellaire, O.
Arauha, J. B.—Electrical Engineer, Sao Paulo, Brazil.
Anderson, E. R.—Foreman of Fan Motor Test, General Electric Co., Pittsfield, Mass.
Bauman, Carl F.—1st Lieut. Philippine Constabulary, Manila, P. I.
Brickner. M. C.—Asst. on Engineer Corps, P. R. R., Toledo, O.
Burnette, F. R.—Estimator, Indiana Steel Co., Gary, Indiana.
Bender, C. F.—Sanitary Engineer, Richmond, Va.
Blosser, C. F.—County Engineer, Wayne County, O.
Bradt. E. R.—Railroad Location, S. P. R., Portland, Oregon.
Bair, Geo. L.—Concrete Inspector, Indiana Steel Co., Gary, Ind.
Brown, A. B.—Carnegie Technical School, Pittsburg, Pa.
Bates. M. J.—Student Apprentice, General Electric Co., Pittsfield, Mass.
Chandler, J. H.—Inspector of Concrete and Asphalt. Sapulpa, Oklahoma.
Cano, L. A.—Student Apprentice, Western Electric Co., Chicago.
Dutton, V. M.—Assistant City Engineer. Marion, O.
Dougherty, Geo.—Draftsman, Rochester and Pittsburg Coal and Iron Co., Punxsutawney, Pa.
Dittman. Rehfus—Concrete Inspection, S. B. Stetson Co., Philadelphia, Pa.
Edwards, Chester—U.S. Reclaimation Service, N. Yakima, Wash.
Emery. H. B.—Asst. on Engineer Corps, C. &. N.W. Ry, Chicago.
Freund, Chas. U.—Lake Shore Electric Co., Chicago, Ill.
Freund, N. U.—Asst. on Engineer Corps, B. & O. R. R., Chicago Junction. Ohio.
Fairchild, W. C.—Structural Draftsman, American Bridge Co., Toledo, Ohio.
Graham, Ivan—Topographical Draftsman, U. S. Reclamation Service, Sunnyside, Wash.
Griffith, C. P.—Structural Eng'r, Owens Machine Co., Toledo, O.
Grau, C. G.—U. S. Army Engineer Corps, Yellowstone National Park, Wyo
Garrett, G. G.—Computer, City Engineer Office, Portland, Ore.
Heist, M. D.—Hydraulic Engineer, Roberts & Heist, Consulting Engineers. Salt Lake City, Utah.
Howell, B. D.—Essex County Engineer's Office. Newark. N. J.
Henderson Geo.—1st Lieut. Philippine Constabulary, Manila, P. I.
Hodge, W. B.—Asst. on Engineer Corps, C. C. C. & St. L. Ry., Galion, Ohio.
Hanson, M. W.—Constructing Engineer, American Bridge Co., Ambridge, Pa.
Knoop, Roy M.—Sub-station Operator. North Shore Electric Co., Evanston, Ill.
Johann, Wm. J.—Washington University, St. Louis, Mo.
Lindemuth, C. Ross—County Surveyor's Office, Ft. Wayne, Ind.
Leutz. G. W.—Requisition Eng., General Electric Co., Pittsburg.
Lipp, V. J.—Asst. on Engineer Corps, P. R. R., Chicago, Ill.
Marty. A. Roy—Sacramento Valley Irrigation Co., Willows, Calif.

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CLASS OF 1910—Continued

Maxwell, M. P.—Civil Engineer, Wheeling, W. Va.
Morrison, H. C.—Switch Board Installer, Western Electric Co., Chicago, Ill.
McAulis, I. J.—Electrician, Standard Steel Car Co., New Castle, Pennsylvania.
Morrison, Thos. D.—Asst. on Engineer Corps, B. & O. S.W. Ry., Grafton, W. Va.
Martin, A. C.—Instrumentman, Vesta Coal Co., Millsboro, Pa.
Meighan, J. J.—Paymaster, Lorimer & Gallagher Co., Contractors, Chicago, Ill.
McClure, A. E.—Asst. on Engineer Corps, S. P. Ry. Co., Lafayette, La.
McManus, S. M.—Civil Engineer, Kansas City.
Murphy, A. C.—County Engineer's Office, St. Clairsville, Ohio.
McGeehan, Frank S., deceased.
Ogan, Chas.—G. E. Scott, Engineer'g Contractor, Pittsburg, Pa.
Price, Paul R.—Asst. on Eng. Corps, C. & N. W. Ry., Chicago.
Parker, H. V.—Erecting Engineer, Westinghouse Electric Co., Cincinnati, Ohio.
Philpott, Austin—U. S. Reclamation Service, No. Yakima, Wash.
Rothrock, R. Paul—Student Apprentice, Westinghouse Electric Mfg. Co., Pittsburg, Pa.
Ruso, Miguel—Civil Engineer, Sancti Spirtius, Cuba.
Reeb, Earl—Asst. on Engineer Corps, B.&O. Ry., Baltimore, Md.
Stromback, Victor—Structural Engineer, Goeller Iron Works, Newark, Ohio.
Stokely, R. Blaine—Civil Engineer, Portsmouth, Ohio.
Shelby, C. C.—U. S. Army Engineer Corps, Yellowstone Park.
Saladin, W. C.—Supt. of Construction, G. E. Scott, Engineering Contractor, Pittsburg, Pa.
Starford, W. E.—Mine Superintendent, Tyreonnel, W. Va.
Sparks, Virgil P.—Motor Designer Century Elec. Co., St. Louis.
Shepherd, Albert—Electric Engineer, Cleveland Illuminating Co., Cleveland, Ohio.
Schroder, C. N.—Architect, Altoona, Pa.
Turley, A. P.—Surveyman, U. S. Engineer Corps, Robertsburg, W. Virginia.
Thurston, E. B.—Foreman of Motor Test, General Electric Co., Pittsfield, Mass.
Timbers, H. H.—Cable Engineer, Western Electric Co., Chicago.
Uehrich, A. F.—Asst. City Engineer, Galion, Ohio.
Will, W. G.—Aid, Coast and Geodetic Survey, Honolulu, Hawaii.
Williams, Albert—Structural Engineer, The Jeffrey Mfg. Co., Columbus, Ohio.
Wismar, L. H.—Asst. County Engineer, Bowling Green, Ohio.
Wagner, W. C.—Instrumentman, Illinois Central Ry., Memphis.
Wagner, M. A.—Civil Engineer, Cleveland, Ohio.
Wilson, F. I.—Civil Engineer, Pittsburg, Pa.
Wells, J. F.—Civil Engineer, Pittsburg, Pa.
Yount, W. R.—Civil Engineer, 1400 U. B. Building, Dayton, O.
Young, O. W.—Motor Inspector Indiana Steel Co., Gary, Ind.
Zeigler, L. E.—Structural Draftsman, Akron, Ohio.